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The International Alcohol Control Study: Methodology and implementation

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Abstract

Introduction and Aims. *The International Alcohol Control (IAC) Study is a multi-country collaborative project to assess patterns of alcohol consumption and the impact of alcohol control policy. The aim of this paper is to report the methods and implementation of the IAC.* ***Design and Methods.*** *The IAC has been implemented among drinkers 16–65 years in high- and middle-income countries: Australia, England, Scotland, New Zealand, St Kitts and Nevis, Thailand, South Africa, Peru, Mongolia and Vietnam (the latter four samples were sub-national). Two research instruments were used: the IAC survey of drinkers and the Alcohol Environmental Protocol (a protocol for policy analysis). The survey was administered via computer-assisted interview and the Alcohol Environmental Protocol data were collected via document review, administrative or commercial data and key informant interviews.* ***Results.*** *The IAC instruments were readily adapted for cross-country use. The IAC methodology has provided cross-country survey data on key measures of alcohol consumption (quantity, frequency and volume), aspects of policy relevant behaviour and policy implementation: availability, price, purchasing, marketing and drink driving. The median response rate for all countries was 60% (range 16% to 99%). Where data on alcohol available for consumption were available the validity of survey consumption measures were assessed by calculating survey coverage found to be 86% or above. Differential response bias was handled, to the extent it could be, using post-stratification weights.* ***Discussion and Conclusions.*** *The IAC study will allow for cross-country analysis of drinking patterns, the relationship between alcohol use and policy relevant behaviour in different countries.* [Huckle T, Casswell S, Mackintosh A-M , Chaiyasong S, Pham CV, Morojele N, Parry CDH, Meier P, Holmes J, Callinan S, Piazza M, Kazantseva E, Bayandorj T, Gray-Phillip G, Haliday S, Chun S, Welch M, Graydon-Guy T, Parker K. The International Alcohol Control Study: Methodology and implementation. *Drug Alcohol Rev* 2018;37:S10–S17]

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Introduction

The International Alcohol Control (IAC) Study is a multi-country collaborative project to evaluate the impact of alcohol control policy cross-country. The IAC is motivated by both the increased awareness of alcohol's contribution to the global burden of disease and injury and greater commitment internationally to implement effective policy to reduce the burden [1,2]. There is also dramatic expansion of commercial alcohol into emerging markets in middle-income countries, many of which have very poorly developed policy responses.

The design of the study is modelled on the International Tobacco Control study [3] and aims to assess the impact of alcohol policies in different cultural and socio-economic contexts on policy-related behaviours (e.g. purchasing behaviour including time of purchase, price paid; social supply, alcohol marketing, drink driving) and alcohol consumption. Surveys of drinkers in the participating countries and analysis of the policy context using a protocol allows for both the assessment of policy effects within countries and cross-country analysis.

The IAC study was designed to allow for the inclusion of a range of countries, to date middle- and high-income countries have participated: Australia, England, Scotland, New Zealand, St Kitts and Nevis, Thailand, South Africa, Peru, Mongolia and Vietnam (ordered in terms of Gross Domestic Product per capita, purchasing power parity, current international $) [4] with Turkey and Canada joining more recently, although data are not yet available. These countries represent a diverse range of cultures, socio-economic contexts, alcohol policies and drinking environments allowing for different research questions to be addressed such as how policies may affect consumption in high- versus middle-income countries and if factors contributing to harmful drinking differ across contexts.

The IAC study provides cross-country survey measures on consumption and, for the first time, the key aspects of policy implementation, availability, price, purchasing, alcohol marketing and drink driving are available.

The aim of this study is to report the methods and implementation of the IAC.

IAC research instruments: IAC survey and alcohol environmental protocol

IAC survey questionnaire

The IAC study has a core survey questionnaire that countries adapt to their context. The reference period for all survey measures is 6 months to minimise overlap of measurement pre–post policy implementation should policy change occur. The measures that comprise the core questionnaire are detailed below.

IAC alcohol consumption framework. Common problems when collecting cross-country alcohol consumption data include the complexity of measuring consumption when drinking patterns, beverages (including informal alcohol, strengths and drink sizes) differ which can lead to lack of comparability. Further surveys, and especially omnibus surveys which ask questions about a range of issues, tend to substantially underestimate consumption [5,6] and cross-country alcohol survey research is not exempt. The IAC consumption framework for collecting consumption data sought to overcome some of these limitations.

The survey utilises a within-location beverage-specific framework developed for national New Zealand alcohol surveys [7,8]. The IAC allows for countries to adapt the consumption measurement framework to their context in terms of locations and beverages, while having summary measures such as total volume consumed at the individual level. The framework first asks about typical frequency of drinking in all locations in which drinking occurs. The locations need to be linked to a physical setting and be mutually exclusive. They should represent the full range of drinking locations in a country not just a subset (with an 'any other specify' option to ensure all possible drinking locations are covered). The average number of locations asked about across IAC countries, including the other specify option, was 14 locations (range 8–17). Locations can easily be adapted for each country; further, it also allows variation in drinking patterns in different locations to be reported, that is, it accounts for drinking occasions typically being heavier in some locations than others.

The IAC consumption framework next asks beverage-specific questions for each location in which respondents drink. Respondents report their consumption of different beverages specific to their country in their own terms and interviewers code these by using containers and glass sizes in which alcohol is commonly served and sold in that country. In this way, respondents do not have to 'calculate' and report their consumption in terms of standard drinks which is likely to introduce error [6]. Calculation of the quantity of mL of ethanol can be made using the appropriate assumptions regarding alcohol content for each beverage and container sizes in each country (each country used their own relevant alcohol content conversions and container sizes based on best available data). The types and strengths of beverages and size of drinks and containers from which alcohol is sold and

consumed differ widely across countries and the approach allows for easy adaptation to different country contexts for beverage types and container sizes and also for informal beverages to be measured. In some countries informal alcohol may comprise a relatively large proportion of the alcohol consumed.

Each country's location and beverage-specific data is transformed, using standardised procedures, into summary consumption variables. For further information please see Casswell *et al.* 2002 [7].

IAC consumption variables. The consumption measures are as follows: frequency of drinking; typical occasion quantity and volume. The consumption measures may be used as continuous variables. There is also considerable flexibility to make a range of categorical variables.

IAC mediating policy variables. These are not often collected in survey research but are valuable to inform policy analysis. They may elucidate the potential pathways between alcohol policies and consumption and allow for assessment of separate effects of several policy changes when changes occur together. By including mediating variables for each policy there is potential to trace the effects of each policy to their ultimate effects on behaviour through different mediational routes. The policy mediating measures collected are:

- Alcohol purchase behaviours including: place and time of purchase: amounts purchased: usual price paid linked to specific on and take away premises (by beverage and container size). Request for ID and successful purchase (for younger respondents).
- Respondents' usual travel-time to obtain alcohol and mode of travel.
- Alcohol marketing measures: awareness of/engagement with, liking of alcohol advertising and experience of point of sale advertising.
- Social supply (obtaining or supplying alcohol to those under the purchase age by parents/guardians, friends, etc.).
- Perceptions of alcohol affordability and availability.
- Perceptions of enforcement (e.g. how likely is it that people will be caught drink driving).
- Perceptions of specific alcohol restrictions (e.g. refusal of service because of intoxication).

Other variables. These include demographics; satisfaction with life overall; assessment of health status; alcohol dependence (Rapid Alcohol Problems Screen) [9] and help seeking behaviour; tobacco use, cannabis use and stressful life events.

Some countries did not ask some core survey questions: alcohol marketing (the full range of questions were not asked in England and Scotland and none were asked in Australia); time of purchase (England and Scotland; Australia, Thailand and Vietnam asked in a way that was not directly comparable with other countries, South Africa asked only for on-premises); England and Scotland collected price data in a different way to fit their country context. Some countries included some non-core questions, specific to their country needs, and these were not considered part of the IAC dataset.

Adaptation of the IAC questionnaire to different country contexts

The IAC core questionnaire was readily adapted to each country including the consumption framework, for example, drinking locations, beverage types and containers in which alcohol are commonly sold and served. With respect to the mediating policy relevant variables, some price and purchasing questions were adapted where relevant; in particular, the types of places where people purchase alcohol differed across countries as did the types of beverages that could be purchased. Prices paid for alcohol were collected in local currency. Other common adaptations included some demographic questions.

Translation of the questionnaire

The questionnaire was translated from English into different languages in the following countries; Thailand, Vietnam, Peru, South Africa (two languages) and Mongolia. There are cultural differences which cannot be entirely controlled for, such as in nuances of language [10] and so back translations to English were required to be provided for checking before programming of the surveys occurred.

Survey programming and piloting

The IAC survey is complex and therefore a computer-assisted interview was a requirement. Open data kit, a free application, was used to program the IAC survey for St Kitts and Nevis, Mongolia, Peru and Vietnam. Other countries used various software programs. Countries piloted the survey to ensure that it was appropriate and suitable for their context.

Ethical approval

Ethical approval to conduct the IAC study was obtained by each country. Parental/guardian

Table 1. *Summary of data collection methods for IAC countries*

Country	Survey year	Age range	Sampling scope	Survey mode	Response rate
Australia	2013	16+	National	Telephone/mobile	37%
England	2012/13	16–65	National	Telephone	16%
Scotland	2012/13	16–65	National	Telephone	19%
New Zealand	2011	16–65	National	Telephone	60%
St Kitts and Nevis	2014/16	16–65	National	Face-to-face	60%[a]
Thailand	2012/2013	15-65	National	Face-to-face	93%
South Africa	2014	16–65	Tshwane metropolitan municipality (covering Pretoria)	Face-to-face	78%
Peru	2015	16–65	Los Olivos district, City of Lima	Face-to-face	82%
Mongolia	2013	16–65	Ulaanbaatar (two districts)	Face-to-face	44%
Vietnam	2014	16–65	Three provinces (Thai Binh, Khanh Hoa and Dong Thap)	Face-to-face	99%

[a]Estimated as final response rate pending.

permission to interview respondents under 18 years was sought in all countries excluding New Zealand, England and Scotland where ethical approval permitted interview of those 16–17 years without parental consent.

Methods

Sampling

Sampling methods were designed to obtain a random representative sample of adult drinkers aged 16–65 years and each country utilised the sampling frame that was most appropriate in their context (face-to-face or telephone sample frames were used). Multistage sampling of geographical units was used to represent St Kitts and Nevis, Thailand; Tshwane metropolitan municipality (covering Pretoria) in South Africa; Los Olivos district in the city of Lima in Peru; two districts in Ulaanbaatar (Bayanzurkh and Chingeltei) in Mongolia; and three provinces in Vietnam (Thai Binh, Khanh Hoa and Dong Thap). In New Zealand, a national stratified sample of residential landline numbers comprised the sample frame, including published and unpublished landline numbers. Scotland and England conducted a stratified sample utilising the same approach. In Australia, a national sample frame of residential landline and cell phone numbers was used (60% residential landline and 40% cell phone numbers) (Table 1).

Interviews were conducted via computer-assisted interviewing face-to-face using tablets in Mongolia, Peru, South Africa, St Kitts and Nevis, Thailand and Vietnam. New Zealand conducted data collection using an in-house Computer-Assisted Telephone Interviewing system and Australia, England and Scotland used telephone interviewing by external survey data collection agencies.

Once a household was recognised as residential, numerous call backs were made at different times of the day and days of the week in order to attempt to reach the household. Once a household was contacted, eligible individuals were enumerated, and one respondent was selected at random by the computer/tablet. A screening interview established eligibility for participation in the study (drinking in the last 6 months and age 16–65 years). Additional screening criteria for Australia meant that a larger proportion of risky drinkers, defined as consuming more than 50 g of alcohol in a session at least once a month, were included than would otherwise be obtained in a random sample. This was accounted for in all analyses with weighting.

Considerable effort was put into minimizing refusals in the baseline data collection and thereby maximising the response rate. Response rates were calculated using at least American Association for Public Opinion Research formula #3 [11].

Response rates

Response rates were high in many countries but were low in Australia, England and Scotland, although the Australian response rate was in the normal range of response rates for telephone surveys in Australia [10] (Table 1). In England and Scotland, a high number of 'no answers' and 'no screener completed—unknown if eligible respondent' contributed to the lower response rates. Mongolia was relatively low for a middle-income country.

The average length of interview was 34 min (range 5 to 75 min).

Koha (gift)

To acknowledge the time respondents gave to the study, respondents in England, Mongolia Scotland,

New Zealand, South Africa and Vietnam received either a monetary gift or voucher (ranging in value from around US$2 to US$15 depending on the country). In Thailand and St Kitts and Nevis an IAC polo shirt and pen was given to participants, respectively.

Weighting

As one person was selected per household, unequal probability of respondent selection was corrected for. Post-stratification weights were calculated in Australia, England, Scotland (where response rates were low) and New Zealand. Data were not available to do so in Mongolia. Australian survey weights also accounted for the over-sampling of risky drinkers. Sampling weights were calculated in South Africa.

Outliers

Determining what is an outlier and how to deal with these respondents in alcohol consumption data is a complex issue, particularly so for cross-country studies. Outliers can be dealt with in a number of ways, and alcohol consumption studies inevitably do deal with outliers but the methods are not always overtly discussed. A common way of dealing with outliers in alcohol data is to cap data, that is, truncate the data at a given level based on what is believed is unlikely that people could drink above. However, the quantity people can drink varies not only in relation to their tolerance to alcohol but age, weight, gender and time over which the alcohol was consumed can also play a part. Further, setting a truncated value across countries will likely be problematic as while this approach may deal with outliers in one country, it may in turn affect 20% of the data in another more heavily drinking country (and truncating 20% of the data is not appropriate as these respondents cannot statistically be considered outliers). Another way of dealing with outliers is as part of the statistical modelling process, that is, the statistician decides which are the outliers following fitting of the model. However, when wanting to undertake cross country analysis this process may lead to differences.

A statistical process to determine and deal with outliers was decided on in the IAC study. The process involves transforming the typically right-skewed distributions of consumption-related variables to normalise them. The transforming function was logarithmic (for typical occasion quantity) and power function (for frequency of drinking). The transformed series was then centred and scaled by subtracting the mean and dividing by the standard deviation (the 99th percentile of respondents were then removed).

Adjusting for sample design in analysis

It is important to account for the sampling design during analysis to ensure that the standard errors are not underestimated (i.e. where modelling or statistical testing is being undertaken). This was not able to be done simply in the IAC as the countries in our study had different sampling designs, ranging from a simple random to a stratified multi-stage sample.

The process used to adjust for cross-country sampling design was based on Kaminska and Lynn 2017 [12] which treats the individual countries as the top level strata. For countries (New Zealand, St Kitts and Nevis, South Africa, Australia and Thailand) which had already been stratified at the first stage, these strata became first stage strata of the combined survey. Countries (Mongolia, England, Scotland and Vietnam) that do not have first stage stratification were treated as a single stratum. Checks were made so that stratum identifications were still unique after combining countries. Primary sampling units remained the same, again making sure that they were still unique after combining all countries. Weights were used where available and assumed to have a weight of one where they were not. Finite population correction was not used as this was incomplete for the majority of countries.

Limitations

In some countries, districts or municipalities were sampled, rather than nationwide (and this is similar to previous cross-country alcohol studies [10,13]. These decisions were taken by the researchers in each country and reflected the level at which policy decisions are made. Country names are used as labels but this limitation needs to be taken into account when interpreting the results (South Africa, Peru, Mongolia and Vietnam samples are sub-national). Response rates were lower in some countries and while post-stratification weights were applied in these countries (excluding Mongolia as data were not available) this does not necessarily correct for bias. Differences in survey mode face-to-face versus telephone may have introduced differences between countries. Telephone interviews can perform in a generally equivalent way to face-to-face interviewing in obtaining estimates of volume and pattern estimates for drinkers [14].

The limitations of the IAC consumption framework include respondent burden due to the number of questions and is a relatively long survey (average length 34 min). Although the complexity of administering the survey is reduced by using a computer-assisted technique, this approach does entail respondents to report repeatedly on the quantity and frequency of their alcohol use. The method is not appropriate for pencil and paper and one country was not able to be included in

much of the cross-country analysis because of an attempt to collect data in this way.

The framework does not measure when people drink in more than one location in one session (e.g. preloading) meaning that typical quantity is underestimated for people who commonly drink in more than one location on an occasion, however, additional questions to measure preloading were available if countries desired this [15]. As the consumption framework provides frequency based on drinking occasions not drinking days, in countries where more than one drinking occasion per day is common the potential for over-estimation of frequency of drinking, and therefore volume, due to summing across contexts is possible (and this was checked for in post data collection data procedures).

Validity of data

Collecting alcohol consumption data using the IAC framework has been found to account for approximately 90% of the alcohol available for consumption in IAC countries where data were available to make the comparison [8,16]. It is likely that this approach to collecting consumption data reminds respondents of drinking occasions, therefore yields higher volume estimates [17–19]. As with other surveys underestimation of dependent drinkers will likely occur, social desirability bias is possible and, depending on the context, homelessness may affect estimates.

Pricing data have not often been included in survey data collection raising possible questions about validity of data collected in this context.

The IAC survey also collects data on price paid for alcohol. Pricing data, that is, what respondents usually pay for the drinks they purchase, have not often been included in survey data collection raising possible questions about validity of data collected. Data on amounts of alcohol purchases collected as part of Household Expenditure Surveys have been found to under-report expenditure [20]. A US national survey that collected expenditure data was found to account for 59.3% of total expenditure [21]. The IAC pricing questions in New Zealand IAC survey accounted for 88% (unweighted) and 98% (weighted) of the estimated weekly spending on alcohol in New Zealand [8,22]. These data have, however, not been validated as yet in other participating countries.

Alcohol environmental protocol

The Alcohol Environmental Protocol (AEP) is also a tool for cross-country policy analysis used in the IAC. It provides data on legislation/regulation, implementation, enforcement and compliance across countries to allow greater understanding of the different alcohol environments in which people make decisions about drinking: how much, what, when and where to consume and in what context. The AEP is used to assess actual changes related to key policy areas, identify hypotheses the survey can test and allow for interpretation of the IAC survey findings.

The AEP includes measures which go beyond whether or not legislation or regulation exist to document, for example, the actual hours of trading, density of alcohol outlets, and enforcement of, and compliance with, policies.

Design

The AEP collects information about key policy areas: availability, pricing, promotion, drink driving and other enforcement issues The AEP provides a structured framework to allow description (quantitative and qualitative) of the alcohol environment in the different participating countries. The AEP measures were the same across all countries.

The regulatory environment is assessed in terms of the legal framework covering the sale, supply, marketing and consumption of alcohol. The implementation and enforcement of the legal framework is assessed by: a comprehensive search synthesizing information drawn from key policy, strategy and reporting documents and the response of different sectors of the alcohol industry (trade journals and media).

Key informant interviews are carried out with relevant stakeholders with knowledge of alcohol control and enforcement and compliance, for example, purposive samples of those responsible for formulating alcohol policy; public health; police. The interviews collected data on, including but not limited to, perception of the alcohol environment, availability, marketing exposure; levels of compliance and enforcement—rated using scales, for example, 1 (never enforced) to 10 (always enforced) and narrative to contextualise the nature of policy and policy change. The numbers interviewed in each country varied from 12 in Scotland to 48 in South Africa.

Routinely collected and administrative data, for example, to document numbers of alcohol outlets, were collected where countries had lists of licensed alcohol outlets available. In some countries where no lists of liquor licences were available, for example, in Vietnam and Thailand, a survey of relevant outlets was undertaken where researchers made field visits to outlets to document numbers (and where possible used GPS to get specific location data).

Discussion

The IAC survey consumption framework has been successfully implemented in high- and middle-income countries, has worked cross-culturally, and provides a rich source of location and beverage-specific consumption data (including informal alcohol). These data were able to be transformed into summary measures for cross-country analysis. Based on our experience the IAC consumption framework is readily adapted to different drinking contexts and analysis shows that coverage has been consistently high (i.e. 86% or over) [8,16]. The IAC survey has also collected policy relevant behaviours that are not often collected but that may act as mediating variables between policy and consumption allowing for effects of policy on behaviour to be tracked through different mediational routes, providing more certainty about relationships between policy and consumption. The complementary IAC instrument the AEP provides assessment of legislation in place and the effects of the legislation on the ground. The AEP will be used in the future to derive hypotheses for cross-country modelling.

The IAC study has limitations (as outlined above); however, it has made some methodological advances over previous cross-country alcohol studies that we believe improves comparability across countries. Consumption measures are detailed, have good validity and were asked in a comparable way across all countries, all IAC countries have random samples designed to be representative of drinkers (no quota samples), outliers have been dealt with in a consistent manner and response rate bias has been handled, to the extent it could be, with post-stratification weighting in countries where response rates were lower. Although not directly affecting comparability, but increasing confidence in findings from statistical analysis, the IAC study has accounted for sample design differences, for example, multi-stage or stratified in statistical analyses [12], where other cross-country studies have often failed to do so sufficiently.

Conclusion

The IAC instruments were readily adapted for cross-country use. The IAC methodology has provided cross-country survey data on key measures of alcohol consumption, aspects of policy relevant behaviour and policy implementation: availability, price, purchasing, marketing and drink driving. The IAC study will allow for cross-country analysis of drinking patterns, the relationship between alcohol use and policy relevant behaviour in different countries.

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Conflicts of interest

The authors have no conflicts of interest.

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